

CLAIMS

1. A flexible organic light emitting device comprising:
a flexible substrate;
a lower electrode layer on said flexible substrate;
an upper electrode layer that is at least semi-transparent;
an organic region between said lower electrode layer and said upper electrode layer, in which electroluminescence can take place when a voltage is applied between said lower electrode layer and said upper electrode layer,
wherein said flexible substrate is comprised of one of the following:
(i) a plastic layer laminated to or coated with a metal layer, (ii) a metal layer sandwiched between two plastic layers, and (iii) a metal foil.
2. The flexible organic light emitting device of claim 1, wherein said flexible substrate is comprised of a plastic layer laminated to or coated with an aluminum layer, the plastic layer being positioned between the lower electrode layer and the aluminum layer.
3. The flexible organic light emitting device of claim 1, wherein said flexible substrate is comprised of a steel foil.
4. The flexible organic light emitting device of claim 1 further comprising an isolation layer between said flexible substrate and said lower electrode layer.

5. The flexible organic light emitting device of claim 4, wherein said isolation layer is a spin-coated polymeric layer or a dielectric layer.
6. The flexible organic light emitting device of claim 3 further comprising an isolation layer between said steel foil and said lower electrode layer.
7. The flexible organic light emitting device of claim 1, wherein said upper electrode layer is transparent.
8. The flexible organic light emitting device of claim 1, wherein said upper electrode layer is a semitransparent or transparent anode.
9. The flexible organic light emitting device of claim 1, wherein said upper electrode layer is a semitransparent or transparent cathode.
10. The flexible organic light emitting device of claim 1, wherein said upper electrode layer is a multilayer structure comprising at least one semitransparent or transparent conductive film.
11. The flexible organic light emitting device of claim 10, wherein said multilayer structure comprises an index-matching layer and a charge carrier injection layer.
12. The flexible organic light emitting device of claim 11, wherein said index-

matching layer comprises an organic or inorganic material having a refractive index effective for enhancing light output.

13. The flexible organic light emitting device of claim 11, wherein said index-matching layer comprises a combination of organic and inorganic materials that are effective for enhancing light output.

14. The flexible organic light emitting device of claim 11, wherein said multilayer structure is an anode and said charge carrier injection layer is a hole injection layer.

15. The flexible organic light emitting device of claim 14, wherein said hole injection layer comprises a high work function metal or a transparent conductive oxide (TCO).

16. The flexible organic light emitting device of claim 15, wherein said high work function metal is gold or silver.

17. The flexible organic light emitting device of claim 15, wherein said TCO is metal oxide.

18. The flexible organic light emitting device of claim 15, wherein said TCO is selected from the group consisting of indium-tin-oxide (ITO), zinc-indium-oxide,

aluminum-doped zinc oxide, Ga-In-Sn-O, SnO₂, Zn-In-Sn-O, and Ga-In-O.

19. The flexible organic light emitting device of claim 14, wherein said hole injection layer comprises an organic material effective for hole injection or a combination of inorganic and organic materials that are effective for hole injection.

20. The flexible organic light emitting device of claim 14, wherein said hole injection layer comprises an inorganic material effective for hole injection or a combination of inorganic and organic materials that are effective for hole injection.

21. The flexible organic light emitting device of claim 11, wherein said multilayer structure is a cathode and said charge carrier injection layer is an electron injection layer.

22. The flexible organic light emitting device of claim 21, wherein said electron injection layer comprises a low work function metal.

23. The flexible organic light emitting device of claim 22, wherein said low work function metal is a rare earth metal.

24. The flexible organic light emitting device of claim 21, wherein said index-matching layer comprises tris-(8-hydroxyquinoline) aluminum (Alq3) or N,N'-di(naphthalene-1-yl)-N,N'-diphenylbenzidine (NPB).

25. The flexible organic light emitting device of claim 21, wherein said cathode comprises a silver layer and said electron injection layer is comprised of a calcium sub-layer over a lithium fluoride sub-layer, the silver layer being formed over the calcium layer.

26. The flexible organic light emitting device of claim 1, wherein at least one of the lower electrode layer and the upper electrode layer is modified to enhance charge carrier injection.

27. The flexible organic light emitting device of claim 1, wherein said organic region comprises (i) a hole transporting layer and (ii) an emissive layer or an electron transporting layer.

28. The flexible organic light emitting device of claim 1, wherein said organic region comprises (i) a hole transporting layer, (ii) an emissive layer, and (iii) an electron transporting layer.